

STUDENT DAYS WITH EDGAR ANDERSON
OR
HOW I CAME TO STUDY SUNFLOWERS¹

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When Dr. Porter invited me to give this address in a symposium honoring Dr. Edgar Anderson, I was, of course, delighted to accept. In my reply to him I suggested several possible topics—the origin of *Solanum quitoense*, the current status of introgression, variation in the bottle gourd, why did man plant seeds, and the title that he selected. I really didn't expect him to choose the one he did, for at the time I suggested it I thought it a rather clever title, but I did not have the vaguest idea as to what I would say, whereas for most of the others I did have some hard data. In a sense it is a most appropriate title, and Dr. Anderson would have enjoyed seeing that I still get into the kind of predicaments I did 30 years ago. It is also appropriate, for after a day of data and hypotheses, something different is called for, and I promise you that this will be different—if nothing else.

I hesitate to give this talk for two reasons. First, I do not feel that I am old enough to give a talk of reminiscences. But the other day my son said to me, "Dad, do you realize that you are a half century old." Somehow when put this way it makes me seem old enough. Secondly, I hesitate giving this talk since it involves talking a lot about myself and exposing a brash young student still wet behind the ears, and it becomes necessary to say a lot about him to develop the theme that the title implies. By way of background I should say that I was a student at Washington University and that sunflowers have been my principal research interest for a number of years.

In a sense the story began in a room in Rebstock Hall in 1939 when I took Bob Woodson's Botany 101 course. I took it as my science requirement, for at the time I had listed myself as an English major. Before the course was over I had changed my mind. However at Bob's suggestion I took no botany the next year, for he thought that I shouldn't change my major too rapidly. So I didn't really become acquainted with Edgar Anderson until my senior year and that was somewhat of an accident.

That year I had planned to take an advanced taxonomy course with Woodson, but that was all changed when he was asked to give a geography course for students the Army had sent to campus. Anderson volunteered to give Woodson's course. That in itself now appears unusual to me. How many of you have colleagues who will volunteer to give your courses? There were two students in Botany 550 that year—myself and another botany major, Dorothy Gaebler (I wonder what became of her?). We soon found that this

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FIGURE 1. Dr. Anderson with Ada Hayden, Richard Holm, Lillian Nagel, and Dorothy Gaebler Heiser. — Edgar was way ahead of his time in many ways, including fashion as this photograph of a field trip to the Arboretum shows (about 1945). I don't think he was ever happier than when he was conducting students on field trips.

was no ordinary course. At the time I assumed it was because of the small number of students, but I was later to learn that Anderson never taught an ordinary course. He was a most unorthodox but a most effective teacher. I don't think that anyone else should try to teach a course the way he did, for only an Edgar Anderson could do it that way. One thing, I remember, was that I wanted to look up answers in books. This he did not encourage—one looked at plants.

The plants that fall were composites, and the entire semester was devoted to them. We started with sunflowers and then proceeded to Asters, Solidagos, and many others. Weedy composites occupied most of our time. Gas rationing limited our trips outside of St. Louis, and, of course, as is well known, Anderson had a special affection for weeds. Of these, none held a greater fascination for him than the common sunflower, and these plants served as the primary basis for his classes' studies year after year. St. Louis with all of its slums, railroad yards, and dump heaps had plenty of sunflowers in those days. Edgar knew all the places where sunflowers grew. In fact, when he met visitors at Union Station he took great delight in taking them to the Garden on one of his "short-cuts." The visitor would see nothing but slums and factories and lots of sunflowers. In addition to the beautiful scenery the

short cut afforded, it didn't take more than 10 minutes longer than the normal route. Edgar would also delight in telling about the time he was in the hospital and some of his students brought him a bouquet of weedy sunflowers. It was on that occasion he told me that he first understood the marvelous events that took place from hour to hour in a sunflower head.

I recall that it was on one of the field trips to Dago Hill with his class of two students that he said, "Charley, I think that if someone looked into sunflowers carefully, he would discover something very significant." That remark stuck with me. He had a singular ability to make even the most insignificant plant a thing of great interest. He always conveyed the impression that there was something very mysterious going on in plants about which scientists knew very little and, moreover, that they didn't realize how little they knew. One had to look at plants in a new way. One way for people to do this was to use a ruler and to look at populations, not single plants. This, of course, we now take for granted.

It was also at this time that I became aware that he could see things in plants that others couldn't, or at least that I couldn't. Some years later I had my doubts and decided that maybe this was partly an act, for there is no doubt about it, he was a showman! But he was a natural showman not an intentional one, and I now realize that he could look at a field of plants and actually see things that escaped others. In trying to analyze this ability I have decided that it involved two things: an ability to correlate a large number of independent observations in a very short time—he was a numerical taxonomist with his own built-in computer—and an ability to analyze patterns. For example, inflorescences of plants which meant little to the ordinary taxonomist revealed a great deal to him.

But back to our course. I recall that he had us get some colored modeling clay and asked us to make models of disk flowers. There were no regular lectures, although he would frequently come into the lab and pick up some plant or our clay model and ask what we had learned. He would listen a while (and for a great talker one of the amazing things about him was that he was also a good listener) and then he might turn around and walk—maybe stalk is a better word—out of the room, or he might hold forth on some subject for 15 minutes or so. I don't recall taking any notes—maybe because I knew there was to be no exam. Our grade was to be based on two term papers which the students were to do jointly.

It takes great courage—or perhaps foolishness—on my part but I am going to read you some from the first term paper. I ask your indulgence and patience but I assure you that I shall not read it all to you, for which you should be thankful.

THE SEX LIFE OF COMPOSITES AND OTHER INTERESTING
FACTS GLEANED FROM BOTANY 550

by dorothy m. gaebler and charles b. heiser, jr.

"To name all of the species of *Solidago* or the asters at sight is a feat probably no one living can perform."—*Nature's Garden*

(It's also hard to do with *Gray's Manual*—Heiser)

In the Ode, "Intimations of Immortality from Recollections of Early Childhood," Wordsworth says:

"To me the meanest flower that blows can give
Thoughts that do often lie too deep for tears."

The Romantics all found depth of meaning, beauty, and expression in the flowers, but Peter Bell in another poem by Wordsworth didn't find any such meanings.

"A primrose by a river's brim
A yellow primrose was to him,
And it was nothing more."

Well, it was that way with us until recently—to us a sunflower was nothing but a sunflower. Then for a brief period it became "that damn thing," and now what it is is simply amazing!

"A fool sees not the same tree that a wise man sees."—Blake.

This article seems very useless in that we won't tell Dr. Anderson very much about the composite family that he doesn't already know, but the point of this is that we get something out of writing the article and that poor Dr. Anderson has to read it. But we're going to try to tell him some things that he doesn't know; for instance, how if he had entered the morphology lab late on a certain afternoon last fall he would have had a wad of clay thrown in his face, pappus and all.

At the beginning of our course we were given several sunflowers. We were told to examine them, which we did. There was nothing extraordinary about them—or so we thought—but we learned fast as the result of some very embarrassing questions asked us about the sex life of *Helianthus*. Our next line of study consisted of making a clay model of a disc flower of *Helianthus*, an assignment that sounded ludicrous at the time and was even called worse things before we finished the model.

"Wee, modest, crimson-tipped flow'r,
Thou's met me in an evil hour."—
To a Mountain Daisy, Burns

A very great friendship was almost broken up over the question of whether to put hairs on the stigma or not to put hairs on the stigma. However, at last we finished and we decided that it really hadn't been so bad, that it was rather fun, and that we did know the disc flower inside out—and we do mean inside out.

That was done. We would start on the other composites next time. We were through with the clay (we thought). So imagine our surprise and consternation when our professor told us that he wanted us to make models of the pappi of as many different composites as we could obtain. We considered hiring some first grade pupil who had some experience with modeling clay, but as we couldn't afford paying union rates we decided to do the things ourselves. The arguments about the hairs on the stigma were now forgotten for far greater and more important controversies. In fact, when Heiser took Gaebler's model of *Gaillardia* and finished it to his satisfaction, sparks flew; but when he criticised and tried to change her model of the marigold pappus, it was practically the last pappus straw. No more work was accomplished that day. A long and beautiful friendship was tottering on the brink, but alas, love conquers all and finally the models were finished. We really began to learn things now.

We learned that one tenth of all of the flowering plants of the world belong to the composite family. In Missouri according to Palmer and Steyermark there are 65 native and 15 introduced genera, 243 native and 71 introduced species, five native forms and two introduced ones, and 15 hybrids of composites. . . .

From here on it begins to sound a little more like an ordinary term paper. I don't recall that I ever saw that paper again until 1960, when it arrived

by mail along with a letter from Edgar. After a first paragraph dealing with variation in *Claytonia*, he went on to write:

Topic No. 2. *Helianthus annuus*. I am returning herewith the paper by Heiser and Gaebler. You will note that it is still in its original cover. The writing on it is Dr. Moore's [G. T. Moore, then Director of the Garden]. I told Dr. Moore what I was doing in the course and that I had leaned over backwards farther, in giving a good mark to this term paper than I ever had before. His eyes twinkled and he said he would like to see the paper, so I turned it over to him. He took it home and read it at his leisure and spoke to me about it some days afterwards. He handed it back with the remark "Anderson, I must say in this case I doubt your judgement. You have had a number of unusual students and have done well with them, but in this case it seems to me that this young man ought to have his ears boxed." However, you will notice that it still bears the pencilled grade of "A" which I put on at that time. I hope you will have the courage and the intelligence to keep this paper. If I thought you would destroy it, I would not let you have it back again, but it is a personal thing and therefore it belongs to you and your wife. However, it has a scientific career of its own and is a demonstration of something which precious few teachers of elementary students seem to get into their heads. One is not turning out finished botanists at the end of the first or second or third course in botany. One is leading students on to become better and better botanists. I still refer to the year (when I just had the two of you) as the most successful year my class ever had, and I feel that very deeply. I hope someday you will have the courage and intelligence to show this to young teachers of botany in mingled pride and humility. It might help them to understand the lengths to which I was willing to go in following William James Beal's method of having promising students write up their own discoveries from every-day examination of plants brought in for them to study.

Here perhaps is a missed opportunity, for this would be a good stopping place, but I agreed to tell why I came to study sunflowers so I must return once more to the forties. Our course in composites was supposed to be followed by one in grasses, but Dr. Anderson had the opportunity to go to Mexico the next semester so the course wasn't given. I wasn't particularly enthusiastic about studying grasses at the time, but I now look upon it as a great opportunity missed.

After receiving my A.B. I continued on at Washington for a Master's under Dr. Greenman's direction. I suggested to him that sunflowers would make a good problem, but he discouraged me. However, since by now I was most interested in composites he suggested another genus in the family, *Psilostrophe*. The thesis was eventually published and forgotten. At the same time, however, my interest in sunflowers continued, probably largely because Edgar gave me little pep talks from time to time. I began to assemble various varieties of cultivated sunflowers which I grew in the greenhouse. I made morphological comparisons and had little thought of doing anything more until Edgar asked if I minded if he attempted to make hybrids between some of the varieties. I said, "No, of course not," but he didn't get around to it immediately so I started making hybrids—which I am sure is exactly what he had hoped I would do.

Edgar decided that I should go to Arizona the next summer to learn about the Hopi sunflower. He managed to get \$50 from the Garden for the trip and arranged with the Museum of Northern Arizona for me to spend a week there. I went by Greyhound bus—and I had a wonderful week although I had to live

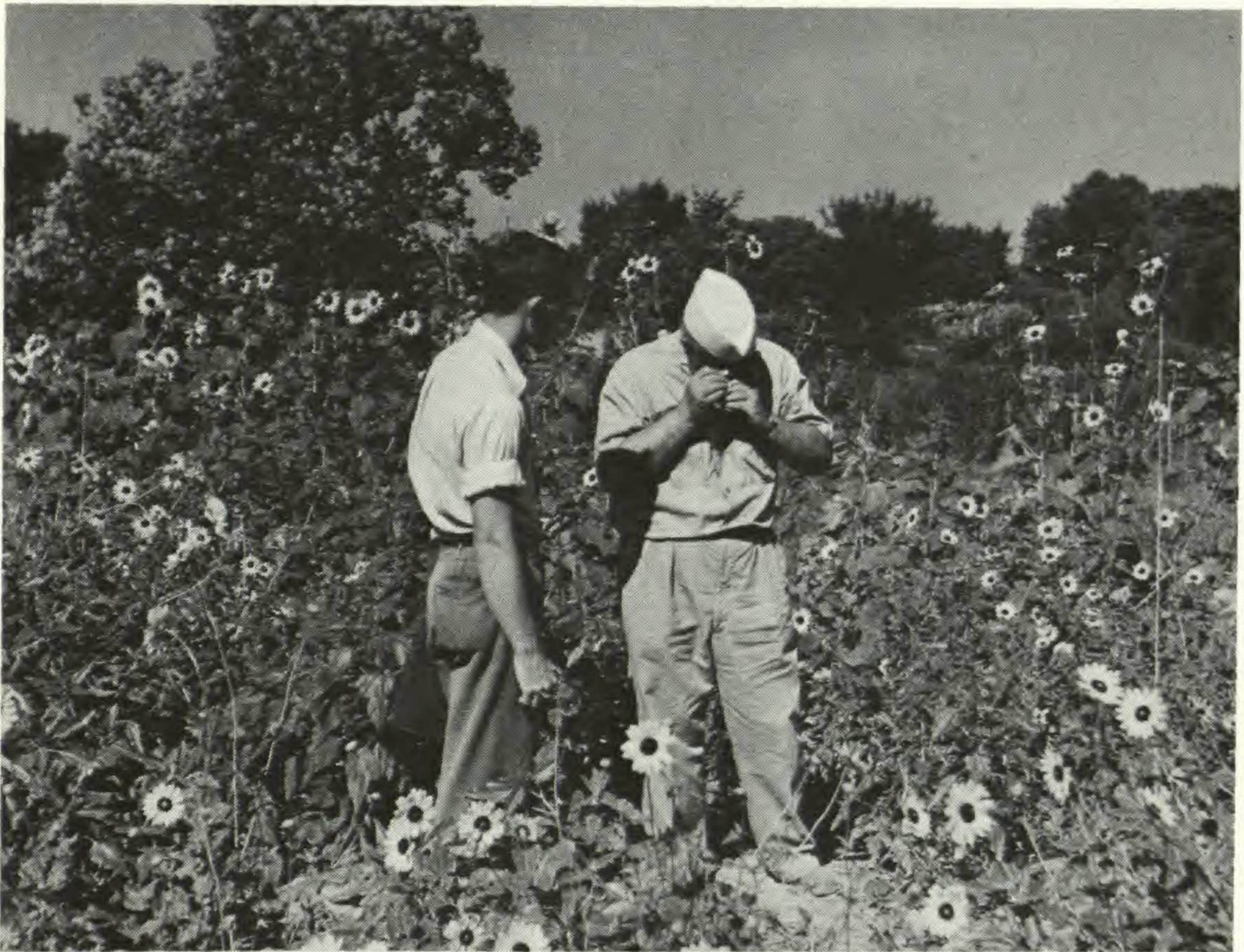


FIGURE 2. Dale Smith and Dr. Anderson. — Edgar examining a sunflower on a visit to the Experimental Garden at Indiana University (about 1955). He was very fond of his "Nehru hat" which he had obtained on a visit to India.

on cheese, since I had forgotten to bring any meat rationing coupons with me. It was my first contact with a flora outside of the Middle West and, as a good taxonomist should, I spent a lot of time filling presses with plants—or bailing hay as it is known to the non-taxonomist. I didn't learn very much about the Hopi sunflower. Because of gas rationing I never did get to the Reservation, although I did get to talk to the Hopis at the Museum about its uses. But fortunately weedy sunflowers—both the common sunflower, *Helianthus annuus*, and *H. petiolaris*—grew near the Museum. I was struck by some unusual variants, but I didn't analyze them fully at the time. When I returned to St. Louis, I decided to take a closer look at *H. petiolaris*—a population of which grew at the streetcar stop next to the University. On the same day I looked at some plants of *H. annuus* which were growing about a quarter of a mile away where the streetcar tracks crossed Skinker Blvd. My attention was drawn to three very depauperate plants which grew a few yards away. The more I examined them the more excited I became, but I decided to look at them again the next day before telling Edgar that I had found some sunflower hybrids. Needless to say, he was delighted, and so was I, for the first time I had discovered something about sunflowers that he didn't already know. I then recalled the unusual plants that I had seen in Arizona and pulling out my dried specimens I realized that they included plants that were probably both F_1 's and backcrosses of *H. annuus* and *H. petiolaris*. Today the finding of another hybrid



FIGURE 3. Robert McClary, Vernita Neher, Jack Humbles, Emma Fraysur, Ralph Jacquain, A. Isabelle Hamilton, Dr. Anderson, Jane Haskett. — A botany class visits the Arboretum in 1959. Photograph taken in front of "Woodson's cabin."

is hardly cause for a celebration, but this was more than a quarter of a century ago when many taxonomists were still very skeptical about Anderson's claims for hybrids. I remember one saying that calling a plant a hybrid was an excuse for not being able to identify it.

After receiving my Master's I stayed on the next year at Washington University as an instructor, as a replacement for Bob Schery, who had gone to Brazil in the wartime rubber program. At the same time I was asked to coach the basketball team at the University. I was offered \$100 for the season. I accepted immediately, for I thought of it as pure gravy, for after all, I was already being paid \$1500 for the year as a botany instructor, and I thought of myself as well off. I won't dwell at length on my career as a basketball coach which lasted only the one season. I kept losing players to the draft and I ended up the season with two war veterans, a couple of 4-F's and some 17 year old boys. In fact, the player situation became so desperate that the manager, Mas Yamada,³ who may be here tonight, had to suit up for the final games. As I recall, Mas distinguished himself by picking up two personal fouls in one minute's playing time in our final game. The reason for the inclusion of basketball here is that it leads up to one of Edgar's

³ Mas, who is still employed in the Department of Biology, was brought to Washington University by Dr. Anderson.

favorite stories, or if not his favorite, one that I heard him tell on numerous occasions.

My office in Rebstock Hall had the only phone for the Department of Botany; and since most of the staff members spent most of their time at the Garden, it fell upon me to handle incoming calls at certain times of the day. Edgar delighted to say that I would always answer, "Botany Department, Coach Heiser speaking." I don't recall that it ever happened and I never thought it particularly funny, but I do know that both Edgar and Bob Woodson were quite pleased that a botany instructor was also a basketball coach, for they thought that it gave a new image to botany.

It was in the spring of the year 1945 that I learned that I was going to the University of California. Actually it wasn't my decision, for I had no particular desire to leave Washington University. But both Edgar and Bob decided that I should go away for a year of seasoning and that Berkeley would be the appropriate place. Bob arranged an assistantship, and Edgar called me in to tell me about the people that I should see immediately—these were W. L. Jepson, whom I never did meet, Carl O. Sauer, and G. Ledyard Stebbins, Jr. I was then quite excited about making chromosome smears, and he told me that Ledyard had a dropper bottle of aceto-carmin within arm's reach anyplace in his lab. Shortly after my arrival I presented myself to Ledyard. I recall noting that there was only one bottle of aceto-carmin in his lab, but that was my only disappointment. I believe that we discussed possible Ph.D. problems for me on this first meeting. I brought up the possibilities of *Stephanomeria*, a composite that I had become acquainted with in the herbarium of the Missouri Botanical Garden, and sunflowers. *Helianthus annuus*, of course, was common in California, and I knew that a closely related annual, *H. bolanderi*, also grew in California. Ledyard told me he knew where it grew—I was later to learn that he knew where nearly everything grew in California—and we set up a field trip for a couple of weeks later.

In the meantime I wrote Anderson about my reception in Berkeley and about the possibilities for my research topic. He wrote back almost immediately (Oct. 16, 1945):

Personally, I have a very different opinion about the *Stephanomeria* problem. It is a very nice problem, you already have your teeth into it and so does Stebbins, and working under his direction you would finish it in record time. It would be a good piece of work and widely acclaimed, BUT it would be just another monograph done in cyto-taxonomy. You wouldn't have learned very much, merely practiced.

On the *Helianthus* problem you are not merely working out a problem, you are uncovering an entire new field of work. There is no question in my mind that for your eventual growth and development you would get the most out of the sunflowers.

Up to the present, you have worked on the problem largely with me, and my ideas are pretty violently warped. It would be very helpful to you to work on *Helianthus* under Stebbins, who has another set of ideas and who undoubtedly is not mad about the genus.

It is your decision, however, and not mine and I shall continue to vote for you even though you do nothing but *Stephanomeria*.

I won't go into detail concerning the trip I made with Ledyard except to

say that we found *Helianthus annuus* and *H. bolanderi* growing together in several places and there were hybrids in nearly every mixed population. I was excited and so was Dr. Stebbins. My research problem for my Ph.D. was determined that day.

I wrote back to Anderson to tell him that I had decided to work on *Helianthus* which delighted him, of course. I also took the opportunity to ask him to explain a remark in his previous letter.

If I am uncovering an entirely new field of work in *Helianthus* I wish you would let me in on what it is. Is it . . . tracing the origin of the cultivated sunflower or the hybrid work? Stebbins, I think, thinks you mean the latter. He is very interested in the hint that I dropped that California *annuus* may be a new subspecies . . . derived from hybridization.

To which he replied:

The taxonomy of cultivated plants is an unsolved and neglected problem. It will require new attitudes, new techniques, and new horizons. What you are doing with *Helianthus annuus* as a prehuman and post human weed, and as a series of cultivated entities is a contribution to a discipline which is yet a-borning. Having read this much go and talk the whole biss over with COS and see if he doesn't agree with me. It is a field which abuts upon the following fields: Genetics, Taxonomy, Agronomy, History, Archaeology, Anthropology. Its major techniques I imagine have still to be invented though one or two are suggested in Anderson and Cutler and in Carter and Anderson. After seeing COS and thinking this over please write me about it again. I can go into horribly complete details if necessary.

Have you been to Davis and seen Beetle? Try to find out everything you can about what Agronomists are like and what they know and don't know.

My best to you both. Don't kill yourselves just because U. of C. will give you the chance. There is no-one there to be an old mother hen on the sidelines to cluck at you when you are not sitting back calmly from time to time to enjoy life. The days I shamelessly played hookey when I was a Graduate Student have paid better dividends than the times I worked too late in the lab. Of course there are limits.

And then on Nov. 12 I wrote:

Stebbins is quite excited (hardly a strong enough word) by sunflowers by now. If you are an authority on taxonomists I am becoming one on geneticists. I see what you mean when you say it would never do for Stebbins and me to work in the same lab. Dot [Dorothy Gaebler Heiser] says that we literally become mad when we see a plant, and Constance thinks our influence on each other will make us both nervous wrecks.

I should add here that although I had been sent to California for a year and was expected to return I never did so. I took my degree there in Botany, not Genetics, so although Stebbins was not my major adviser in name, he was in spirit and deed.

I continued to exchange letters with Edgar while I was in Berkeley and in fact, ever since. I have a file of correspondence with him over 2 inches thick. At the time it didn't seem unusual to receive a two page letter from him, but looking back I realize that it is something that an ordinary professor doesn't find time for. Over the years there was no telling from where I would get a postcard from him with some observations about a sunflower he had seen in his travels. This past summer I spent a most delightful afternoon reading all his letters, and I would like to quote just a few comments from some of them.



FIGURE 4. Dr. Anderson with potatoes. — Here we are spending a nice quiet evening with potatoes in 1959. Edgar's essay, "How to spend a Nice Quiet Evening with a Potato" (Missouri Botanical Garden Bulletin 43: 50-53. 1955), is my favorite among the many delightful popular articles he wrote. The table where many a student and visitor has eaten is situated behind the "Barn" at the Arboretum. Edgar and Mrs. Anderson used to live at the "Barn" during the summer in his earlier years at the Garden, while he grew his experimental plants in nearby fields.

On February 6, 1946—on being frustrated at not finding something he wanted in the herbarium—he wrote,

Oh God, oh stamp collecting, when will taxonomists ever take any interest in being biologists. Once when I traveled with E. J. Palmer I went to a good deal of trouble to get a whole sheet of Lily pods and he threw it away because it made such a nasty looking specimen and he wasn't certain what species it belonged to anyway.

Later the same year (Nov. 18):

Jon Sauer is starting in on several minor cultivated plants. I've learned a lot as usual. What an incredible gift good students are.

In 1950 (Feb. 2) when I wrote him that I was looking for some new research problems,

Butt. What's this about ditching *Helianthus*? I suspect you have been traveling with Job's comforters. If you are tired of the damned weeds and don't want to look at em any more for a while, why by all means put them aside. Don't let anybody's advice, including mine, keep you from what you are happiest doing.

This was followed by some compelling reasons why I should continue.

Once I obtained roots of a hybrid of *Helianthus grosseserratus* × *maximiliani* which he grew as an ornamental in his backyard but I failed to get information on its parentage. So I wrote him and he sent back this very brief message (May 26, 1960):

The hybrid plants came up in my garden where I was growing both parent plants. I ask you, Mr. Taxonomist, is this a natural or an artificial hybrid?

After I came to Indiana University in 1947 he continued to be not only my teacher, but my students' teacher as well. For many years I used to take my class to the Missouri Botanical Garden's Arboretum at Gray Summit for a weekend field trip. Whenever possible he would come out to join us. He delighted in telling my students stories about me when I was a student and loved to try to embarrass the proper young professor. He also came to Bloomington frequently to see my sunflower garden.

It's time to stop and I haven't told you anything about his music sessions. He played the recorder. Nor about the square dances at the "Barn." Nor about his cooking. I think one of the worst dishes I have ever eaten was his spam covered with bread crumbs soaked in loganberry juice—perhaps because he raved so about it. I have talked way too much about myself, but I hope by doing so it has given you some insight into the character of Edgar Anderson, teacher and botanist. The latter is the title he chose for himself in his later years at the Garden.